

CLAIMS

1. A blending system, comprising:
a first material supply line;
a second material supply line;
5 a static mixer fluidly connected downstream of the first and the second material supply lines; and
a process control system comprising a first flow control device positioned on at least one of the first and the second material supply lines, a first sensor positioned downstream of the static mixer, and a controller comprising logic code to provide a control signal to the
10 first flow control device based upon a sensor signal provided by the first sensor.
2. The blending system of claim 1, wherein the first sensor is selected from the group consisting of a density sensor, a percent solids sensor, a particle counter, a pH sensor, a conductivity sensor, an oxidation and reduction potential sensor, a refractive index sensor,
15 and combinations thereof.
3. The blending system of claim 2, wherein the first sensor is a density sensor.
4. The blending system of claim 2, wherein the first sensor is a percent solids sensor.
- 20 5. The blending system of claim 2, wherein the first sensor is a particle counter.
6. The blending system of claim 2, wherein the first sensor is a pH sensor.
- 25 7. The blending system of claim 2, wherein the first sensor is an oxidation and reduction potential sensor.
8. The blending system of claim 2, wherein the first sensor is a refractive index sensor.
- 30 9. The blending system of claim 1, wherein the process control system further comprises an input device connected to the controller to provide an input signal representing a desired blend of process materials.

10. The blending system of claim 1, wherein the controller comprises logic code to provide a control signal to the first flow control device based upon the sensor signal and the input signal.

5 11. The blending system of claim 1, further comprising:
a holding vessel including an inlet and an outlet;
a recirculation line fluidly connected to the inlet and the outlet; and
a second flow control device fluidly connected to the recirculation line and to one of
the first and the second material supply lines.

10 12. The blending system of claim 11, wherein the second flow control device is the same flow control device as the first flow control device.

13. The blending system of claim 11, further comprising a flow control device connected
15 to the recirculation line.

14. The blending system of claim 11, further comprising:
a second sensor connected to the recirculation line selected from the group
consisting of a density sensor, a percent solids sensor, a particle counter, a pH sensor, a
20 conductivity sensor, a oxidation and reduction potential sensor, a refractive index sensor,
and combinations thereof.

15. The blending system of claim 11, further comprising a semiconductor manufacturing
tool fluidly connected downstream of the static mixer.

25 16. The blending system of claim 1, further comprising a particle separator positioned on
one of the first material supply line, the second material supply line and the recirculation
line.

30 17. The blending system of claim 1, further comprising a holding vessel fluidly
connected downstream of the static mixer.

18. A blending system, comprising:
a plurality of material supply lines;

a static mixer positioned downstream of the plurality of material supply lines and fluidly connected to the plurality of material supply lines;

a process control system comprising a controller, an input device in communication with the controller to provide an input signal representing a desired blend of process materials and a first valve connected to one of the plurality of material supply lines and to the controller; and

a dispensing subsystem, comprising a holding vessel having an inlet and an outlet, a recirculation line fluidly connected to the inlet and the outlet and a second valve fluidly connected to the recirculation line and to one of the plurality of material supply lines such that material from the recirculation line may be selectively diverted to the material supply line.

19. The blending system of claim 18, wherein the second valve is the same valve as the first valve.

20. The blending system of claim 18, further comprising a pump connected to the recirculation line.

21. The blending system of claim 18, further comprising a sensor selected from the group consisting of a density sensor, a pH sensor, a conductivity sensor, an oxidation and reduction potential sensor, a particle counter, a refractive index sensor, a percent solids sensor, and combinations thereof, connected to the recirculation line.

22. The blending system of claim 18, further comprising a particle separator positioned on one of the first material supply line, the second material supply line and the recirculation line.

23. The blending system of claim 18, wherein the first valve comprises a plurality of valves each connected to one of the plurality of material supply lines and the controller.

24. The blending system of claim 18, further comprising a sensor positioned downstream of the static mixer and in communication with the controller.

25. The blending system of claim 24, wherein the sensor is selected from the group consisting of a density sensor, a pH sensor, a conductivity sensor, an oxidation and reduction potential sensor, a particle counter, a refractive index sensor, a percent solids sensor, and combinations thereof, and is connected to the recirculation line.

26. The blending system of claim 24, wherein the controller comprises logic code to provide a signal to the first valve based upon a signal provided by the sensor.

27. A method of supplying blended process materials, comprising:
supplying a first process material through a first of material supply line;
supplying a second process material through a second of material supply line;
blending the first and the second process materials in a static mixer fluidly connected downstream of the first and the second material supply lines; and
regulating the supply of one of the first and the second process materials with a first valve positioned on one of the first and the second material supply lines based upon a sensor signal provided by a sensor positioned downstream of the static mixer.

28. The method of supplying blended process materials of claim 27, wherein the sensor provides a sensor signal corresponding to a property selected from of a group consisting of a density, a percent solids, a particle count, a pH, a conductivity, an oxidation and reduction potential, a refractive index of the blended process material, and combinations thereof.

29. The method of supplying blended process materials of claim 27, further comprising receiving an input signal representing a desired blend of process materials from an input device connected to the controller.

30. The method of supplying blended process materials of claim 27, further comprising:
holding one of the first and the second process materials in a holding vessel having an inlet and an outlet;

recirculating the one of the first and the second process materials in a recirculation line connected to the holding vessel inlet and outlet; and
diverting at least a portion of the one of the first and the second process materials into one of the first and the second material supply lines with a second valve connected to the recirculation line and to the one of the first and the second material supply lines.

31. A method of supplying blended process materials, comprising:

supplying a plurality of process materials through a plurality of material supply lines;

5 blending the plurality of process materials in a static mixer positioned downstream of the plurality of material supply lines;

regulating the supply of the plurality of process materials with a process control system comprising:

a controller,

10 an input device, wherein the input device is connected to the controller to provide an input signal representing a desired blend of process materials, and

a first valve connected to one of the plurality of material supply lines and to the controller;

15 holding one or more of the plurality of process materials in a holding vessel having an inlet and an outlet;

recirculating the one or more of the plurality of process materials in a recirculation line connected to the holding vessel inlet and outlet; and

20 diverting a portion of the one or more of the plurality of process materials into one of the plurality of material supply lines with a second valve connected to the recirculation line and to the one or more of the plurality of material supply lines.

32. The method of claim 31, wherein the first valve is the same as the second valve.

33. The method of claim 31, wherein recirculation includes pumping the process
25 materials.

34. The method of claim 31, wherein recirculation of the one or more of the plurality of process materials further comprises measuring a property selected from the group consisting of a density, a pH, a conductivity, an oxidation and reduction potential, a percent solids, a
30 number of particles, an index of refraction, and combinations thereof, of the one or more of the plurality of process materials.

35. The method of claim 31, further comprising separating particulates from the recirculation line.

36. The method of claim 31, wherein regulating the feeding of the plurality of process materials with a process control system further comprises controlling the first valve based upon a sensor signal provided by a sensor downstream of the static mixer.

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TOTAL 276660